CLAIMS

1. A liquid ejection apparatus having a line head arranged by juxtaposing a plurality of liquid ejection parts of unit heads so as to connect the unit head to the adjacent unit head, each unit head having at least part of the liquid ejection part for ejecting ink droplets from a nozzle, the liquid ejection apparatus comprising:

principal control means for controlling each of the liquid ejection part to eject liquid droplets from the nozzle;

auxiliary control means for controlling liquid droplets to be ejected in at least one direction different from the ejection direction controlled by the principal control means in the arranging direction of the liquid ejection parts; and

auxiliary control execution determining means for individually setting whether the auxiliary control means is executed for each of the unit head.

2. A liquid ejection apparatus having a line head arranged by juxtaposing a plurality of liquid ejection parts of unit heads so as to connect the unit head to the adjacent unit head, each unit head having at least part of the liquid ejection part for ejecting ink droplets from a nozzle, the liquid ejection apparatus comprising:

ejection direction changing means for enabling the

ejection direction of liquid droplets ejected from the nozzle of each of the liquid ejection part to change in at least two different directions in the arranging direction of the liquid ejection parts; and

reference-direction setting means for individually setting one reference principal direction for each of the unit head among a plurality of ejection directions of liquid droplets established by the ejection direction changing means.

3. A liquid ejection apparatus having a line head arranged by juxtaposing a plurality of liquid ejection parts of unit heads so as to connect the unit head to the adjacent unit head, each unit head having at least part of the liquid ejection part for ejecting ink droplets from a nozzle, the liquid ejection apparatus comprising:

ejection direction changing means for enabling the ejection direction of liquid droplets ejected from the nozzle of each of the liquid ejection part to change in at least two different directions in the arranging direction of the liquid ejection parts; and

ejecting-angle setting means for individually setting liquid droplets established by the ejection direction changing means for each of the unit head.

4. A liquid ejection apparatus having a line head arranged by juxtaposing a plurality of liquid ejection parts

of unit heads so as to connect the unit head to the adjacent unit head, each unit head having at least part of the liquid ejection part for ejecting ink droplets from a nozzle, the liquid ejection apparatus comprising:

ejection direction changing means for enabling the ejection direction of liquid droplets ejected from the nozzle of each of the liquid ejection part to change in at least two different directions in the arranging direction of the liquid ejection parts;

ejecting-angle setting means for individually setting liquid droplets established by the ejection direction changing means for each of the unit head; and

reference-direction setting means for individually setting one reference principal direction for each of the unit head among a plurality of ejection directions of liquid droplets established by the ejection direction changing means.

5. The apparatus according to any one of Claims 2 to 4, further comprising ejection control means for controlling liquid-droplet ejection so as to form one pixel line or one pixel using at least two different liquid ejection parts by ejecting ink droplets in different directions, using the ejection direction changing means, from at least two different liquid ejection parts arranged in the vicinity so as to land liquid droplets on the same pixel line so as to

form the pixel line or by landing liquid droplets on the same pixel region so as to form the pixel.

6. The apparatus according to any one of Claims 2 to 4, further comprising ejection control means for controlling liquid-droplet ejection in that a pixel line is formed by ejecting liquid droplets in different directions from at least two different liquid ejection parts arranged in the vicinity so as to land liquid droplets on the same pixel line using the ejection direction changing means, or the one pixel line or one pixel is formed by landing liquid droplets on the same pixel region so as to form the pixel using at least two different liquid ejection parts arranged in the vicinity.

7. The apparatus according to any one of Claims 2 to 4, further comprising:

first ejection control means for controlling liquid-droplet ejection in that a pixel line is formed by ejecting liquid droplets in different directions from at least two different liquid ejection parts arranged in the vicinity so as to land liquid droplets on the same pixel line using the ejection direction changing means, or the one pixel line or one pixel is formed by landing liquid droplets on the same pixel region so as to form the pixel using at least two different liquid ejection parts arranged in the vicinity; and

second ejection control means for controlling liquid-droplet ejection in that when liquid droplets are landed on a pixel region, for each liquid-droplet ejection from the liquid ejection part, any one of M different landing positions (M: integers of 2 or more), at least part of which is included within the pixel region, is determined as a landing position of liquid droplets in the arranging direction of liquid ejection parts in the pixel region so that the ejection is controlled using the ejection direction changing means so as to land liquid droplets at the determined position.

8. The apparatus according to any one of Claims 2 to 4, further comprising number of pixels increasing means in that using the ejecting-direction changing means, liquid droplets ejected from each liquid ejection part are controlled so as to land at two or more different positions in the arranging direction of liquid ejection parts, so that the number of pixels is increased more than that formed by landing liquid droplets from each liquid ejection part at one position.

9. The apparatus according to any one of Claims 2 to 4, further comprising:

number of pixels increasing means in that using the ejecting-direction changing means, liquid droplets ejected from each liquid ejection part are controlled so as to land at two or more different positions in the arranging

direction of liquid ejection parts, so that the number of pixels is increased more than that formed by landing liquid droplets from each liquid ejection part at one position; and

ejection control means for controlling liquid-droplet ejection in that a pixel line is formed by ejecting liquid droplets in different directions from at least two different liquid ejection parts arranged in the vicinity so as to land liquid droplets on the same pixel line using the ejection direction changing means, or the one pixel line or one pixel is formed by landing liquid droplets on the same pixel region so as to form the pixel using at least two different liquid ejection parts arranged in the vicinity.

10. The apparatus according to any one of Claims 2 to 4, further comprising:

number of pixels increasing means in that using the ejecting-direction changing means, liquid droplets ejected from each liquid ejection part are controlled so as to land at two or more different positions in the arranging direction of liquid ejection parts, so that the number of pixels is increased more than that formed by landing liquid droplets from each liquid ejection part at one position; and

ejection control means for controlling liquid-droplet ejection in that when liquid droplets are landed on a pixel region, for each liquid-droplet ejection from the liquid ejection part, any one of M different landing positions (M:

integers of 2 or more), at least part of which is included within the pixel region, is determined as a landing position of liquid droplets in the arranging direction of liquid ejection parts in the pixel region so that the ejection is controlled using the ejection direction changing means so as to land liquid droplets at the determined position.

11. The apparatus according to any one of Claims 2 to 4, further comprising:

number of pixels increasing means in that using the ejecting-direction changing means, liquid droplets ejected from each liquid ejection part are controlled so as to land at two or more different positions in the arranging direction of liquid ejection parts, so that the number of pixels is increased more than that formed by landing liquid droplets from each liquid ejection part at one position;

first ejection control means for controlling liquid-droplet ejection in that a pixel line is formed by ejecting liquid droplets in different directions from at least two different liquid ejection parts arranged in the vicinity so as to land liquid droplets on the same pixel line using the ejection direction changing means, or the one pixel line or one pixel is formed by landing liquid droplets on the same pixel region so as to form the pixel using at least two different liquid ejection parts arranged in the vicinity; and

second ejection control means for controlling liquid-droplet ejection in that when liquid droplets are landed on a pixel region, for each liquid-droplet ejection from the liquid ejection part, any one of M different landing positions (M: integers of 2 or more), at least part of which is included within the pixel region, is determined as a landing position of liquid droplets in the arranging direction of liquid ejection parts in the pixel region so that the ejection is controlled using the ejection direction changing means so as to land liquid droplets at the determined position.

12. The apparatus according to Claim 1, wherein the liquid ejection part comprises:

a liquid chamber for accommodating liquid to be ejected;

bubble generating means arranged within the liquid chamber for generating bubbles in liquid contained in the liquid chamber by supplying energy; and

a nozzle-forming member having nozzles formed thereon for ejecting liquid contained in the liquid chamber in operatively associated with generation of bubbles, and

wherein the auxiliary control means controls liquid droplets to be ejected in a direction different from that of liquid droplets ejected by the principal control means by supplying energy to the bubble generating means in a

different way from that of the principal control means.

13. The apparatus according to Claim 1, wherein the liquid ejection part comprises:

a liquid chamber for accommodating liquid to be ejected;

a heating element arranged within the liquid chamber for generating bubbles in the liquid contained in the liquid chamber by supplying energy; and

a nozzle-forming member having nozzles formed thereon for ejecting liquid contained in the liquid chamber in operatively associated with generation of bubbles, and

wherein a plurality of the heating elements are juxtaposed in the one liquid chamber in the arranging direction of the liquid ejection parts, and are connected together in series, and

wherein the auxiliary control means comprises a circuit having a switching element connected between the heating elements connected together in series, and controls the ejection direction of liquid droplets to be ejected in a direction different from that by the principal control means by passing electric current between the heating elements through the circuit or by discharging electric current from between the heating elements through the circuit so as to control electric current for supplying to each heating element.

14. The apparatus according to any one of Claims 2 to 4, wherein the liquid ejection part comprises:

a liquid chamber for accommodating liquid to be ejected;

bubble generating means arranged within the liquid chamber for generating bubbles in liquid contained in the liquid chamber by supplying energy; and

a nozzle-forming member having nozzles formed thereon for ejecting liquid contained in the liquid chamber in operatively associated with generation of bubbles, and

wherein the ejection direction changing means comprises:

principal control means for ejecting liquid droplets from the nozzle by supplying energy to the bubble generating means; and

auxiliary control means for controlling liquid droplets to be ejected in a direction different from that of liquid droplets ejected by the principal control means by supplying energy to the bubble generating means in a different way from that of the principal control means.

15. The apparatus according to any one of Claims 2 to 4, wherein the liquid ejection part comprises:

a liquid chamber for accommodating liquid to be ejected;

a heating element arranged within the liquid chamber

for generating bubbles in the liquid contained in the liquid chamber by supplying energy; and

a nozzle-forming member having nozzles formed thereon for ejecting liquid contained in the liquid chamber in operatively associated with generation of bubbles,

wherein a plurality of the heating elements are juxtaposed in the one liquid chamber in the arranging direction of the liquid ejection parts, and are connected together in series, and

wherein ejection direction changing means comprises a circuit having a switching element connected between the heating elements connected together in series, and controls the ejection direction of liquid droplets to be ejected in at least two directions in the arranging direction of liquid ejection parts by passing electric current between the heating elements through the circuit or by discharging electric current from between the heating elements through the circuit so as to control electric current for supplying to each heating element.

16. A liquid ejecting method using a line head arranged by juxtaposing a plurality of liquid ejection parts of unit heads so as to connect the unit head to the adjacent unit head, each unit head having at least part of the liquid ejection part for ejecting ink droplets from a nozzle, the liquid ejecting method comprising the steps of:

executing principal control means for ejecting liquid droplets from the nozzle of the liquid ejection part;

enabling auxiliary control means to be executed for ejecting liquid droplets in at least one direction different from that controlled by the principal control means in the arranging direction of the liquid ejection parts; and

individually setting whether the auxiliary control means is executed for each of the unit head.

17. A liquid ejecting method using a line head arranged by juxtaposing a plurality of liquid ejection parts of unit heads so as to connect the unit head to the adjacent unit head, each unit head having at least part of the liquid ejection part for ejecting ink droplets from a nozzle, the liquid ejecting method comprising the steps of:

enabling the ejection direction of liquid droplets ejected from the nozzle of the liquid ejection part to change in at least two different directions in the arranging direction of the liquid ejection parts; and

individually setting one reference principal direction for each of the unit head among a plurality of ejection directions of liquid droplets.

18. A liquid ejecting method using a line head arranged by juxtaposing a plurality of liquid ejection parts of unit heads so as to connect the unit head to the adjacent unit head, each unit head having at least part of the liquid

ejection part for ejecting ink droplets from a nozzle, the liquid ejecting method comprising the steps of:

enabling the ejection direction of liquid droplets ejected from the nozzle of the liquid ejection part to change in at least two different directions in the arranging direction of the liquid ejection parts; and

individually setting one ejecting angle of liquid droplets for each of the unit head.

19. A liquid ejecting method using a line head arranged by juxtaposing a plurality of liquid ejection parts of unit heads so as to connect the unit head to the adjacent unit head, each unit head having at least part of the liquid ejection part for ejecting ink droplets from a nozzle, the liquid ejecting method comprising the steps of:

enabling the ejection direction of liquid droplets ejected from the nozzle of the liquid ejection part to change in at least two different directions in the arranging direction of the liquid ejection parts;

individually setting one reference principal direction for each of the unit head among a plurality of ejection directions of liquid droplets; and

individually setting one ejecting angle of liquid droplets for each of the unit head.